AMENDMENTS TO THE CLAIMS

1. (Original) A method of producing a piezoelectric ceramic thick film on a substrate, said method comprising:

- providing a piezoelectric ceramic material in powder form;
- forming a liquid mixture by mixing the powdered material with a liquid phase precursor of a metal oxide of low-melting point, said precursor being adapted to decompose, upon subsequent annealing, into the metal oxide;
- drying the liquid mixture to form a precipitate;
- milling the precipitate to form a powdered precipitate;
- adding an organic carrier to the powdered precipitate;
- further milling the precipitate to form a paste;
- depositing a layer of the paste, as a wet film, onto the substrate; and
- annealing the layered substrate at a temperature and for a time sufficient to cause transformation of the paste into the thick film.

2. (Original) A method according to claim 1, wherein the piezoelectric ceramic material is an inorganic ceramic material which exhibits the piezoelectric effect.

3. (Original) A method according to claim 2, wherein the piezoelectric ceramic material is lead zirconate titanate (PZT).

4. (Original) A method according to claim 1, wherein the metal oxide is adapted to form a glass phase upon annealing at elevated temperature.

5. (Original) A method according to claim 4, where in the metal oxide is selected from one or more of Li_2O, Bi_2O_3 and PbO.

6. (Original) A method according to claim 5, wherein the liquid phase precursor is a combination of the liquid phase precursors of Li_2O and Bi_2O_3.

7. (Currently Amended) A method according to claim 5 ~~or claim 6~~, wherein the liquid phase precursor of Li_2O is lithium ethoxide dissolved in ethanol.

8. (Currently Amended) A method according to claim 5 ~~or claim 6~~, wherein the liquid phase precursor of Bi_2O_3 is bismuth nitrate dissolved in acetic acid.

9. (Currently Amended) A method according to ~~any one of claims 6 to 8~~ claim 6, wherein the liquid phase precursors of Li_2O and Bi_2O_3 are mixed to form a Li-Bi acetic acid solution.

10. (Original) A method according to claim 5, wherein the metal oxide is PbO and the liquid phase precursor is a solution of lead acetate.

11. (Currently Amended) A method according to ~~any one of claims 1 to 10~~ claim 1, wherein the powdered piezoelectric material is in the form of a suspension in ethanol.

12. (Original) A method according to claim 11, wherein the powdered piezoelectric material is fine-grained having an average grain size of below about 1.0μm.

13. (Original) A method according to claim 12, wherein the average grain size is about 0.5μm.

14. (Currently Amended) A method according to ~~any one of claims 1 to 13~~ claim 1, wherein the total amount of the metal oxide in the thick film is between about 1% and 5%, by weight.

15. (Original) A method according to claim 11, wherein the suspension is mixed with the Li-Bi acetic acid solution, or the lead acetate solution, to form a liquid mixture.

16. (Original) A method according to claim 15, wherein the liquid mixture is dried at an elevated temperature to form a dried precipitate.

17. (Original) A method according to claim 16, wherein the liquid mixture is dried at a temperature between about 75°C and 105°C for up to 10 hours.

18. (Currently Amended) A method according to claim 16 ~~or claim 17~~, wherein the dried precipitate is formed into a powdered precipitate.

19. (Original) A method according to claim 18, wherein the powdered precipitate is formed by milling the dried precipitate with a ball mill.

20. (Currently Amended) A method according to claim 18 ~~or claim 19~~, wherein an organic carrier is added to the powdered precipitate.

21. (Original) A method according to claim 20, wherein the organic carrier is selected from one or more of ethyl cellulose, terpineol, and ESL 400 organic binder.

22. (Original) A method according to claim 21, wherein the organic carrier is ESL 400 organic binder.

23. (Currently Amended) A method according to ~~any one of claims 18 to 22~~ claim 18, wherein the powdered precipitate and organic carrier are milled to form a paste.

24. (Original) A method according to claim 23, wherein the paste is deposited onto a surface of the substrate, by a printing process, as a wet film.

25. (Original) A method according to claim 24, wherein the printing process is a screen printing process.

26. (Currently Amended) A method according to ~~any one of claims 1 to 25~~ claim 1, wherein, prior to annealing, the layered substrate is dried.

27. (Currently Amended) A method according to ~~any one of claims 1 to 25~~ claim 1, wherein, prior to annealing, an isostatic pressure is applied to the film.

28. (Original) A method according to claim 26, wherein the drying temperature is between about 20°C and about 175°C.

29. (Currently Amended) A method according to ~~any one of claims 1 to 28~~ claim 1 wherein the layered substrate is annealed at a temperature of between about 800°C and about 1000°C.

30. (Original) A method according to claim 29, wherein the annealing is conducted for between about 10 minutes and about 4 hours.

31. (Currently Amended) A method according to ~~any one of claims 1 to 30~~ claim 1, wherein the substrate is formed of silicon.

32. (Currently Amended) A method according to ~~any one of claims 1 to 31~~ claim 1, wherein the surface of the substrate has a coating of platinum and the paste is deposited on this platinum coating.

33. (Currently Amended) A method according to ~~any one of claims 1 to 32~~ claim 1, wherein a metal electrode is formed on the piezoelectric ceramic thick film.

34. (Original) A method according to claim 33, wherein the metal is silver and the electrode material is deposited on the film by a screen printing process.

35. (Original) A method according to claim 34, wherein the layered substrate is fired at elevated temperature to form the electrode.

36. (Original) A method of producing a piezoelectric ceramic thick film on a substrate, said method being substantially as hereinbefore described with reference to Figure 1 and Example 1 or to Example 2.

37. (Currently Amended) A substrate having a piezoelectric ceramic thick film thereon, formed according to the method of ~~any one of claims 1 to 36~~ claim 1.

38. (Currently Amended) A piezoelectric sensor or actuator having a piezoelectric ceramic thick film, wherein said thick film has been formed on said substrate according to the method of ~~any one of claims 1 to 36~~ claim 1.